

CLAIMS

What is claimed is:

1. A diagnostic system for a core composite structure comprising:
a seal assembly;
an attachment movable relative to said seal assembly; and
a sensor operable to determine relative movement of said attachment.
2. The diagnostic system as recited in claim 1, wherein said seal assembly comprises a vacuum seal.
3. The diagnostic system as recited in claim 1, wherein said attachment comprises a vacuum-assisted suction cup.
4. The diagnostic system as recited in claim 1, wherein said sensor comprises an Linear Variable Differential Transformer (LVDT).
5. The diagnostic system as recited in claim 1, wherein said vacuum assisted attachment is located within said seal assembly.
6. The diagnostic system as recited in claim 1, further comprising a vacuum cylinder attached to said vacuum assisted attachment.
7. The diagnostic system as recited in claim 6, wherein said vacuum cylinder drives said vacuum assisted attachment relative to said seal assembly.

8. A diagnostic system for a core composite structure comprising:
a seal assembly comprising an outer seal and an inner seal;
a vacuum-assisted attachment located within said inner seal, said vacuum-assisted attachment movable along an axis relative to said seal assembly;
a vacuum cylinder comprising a piston attached to said vacuum assisted attachment; and
a sensor operable to determine relative movement of said vacuum assisted attachment.

9. The diagnostic system as recited in claim 8, wherein said vacuum assisted attachment comprises a suction cup mounted to a hollow shaft, said hollow shaft mounted to said piston.

10. The diagnostic system as recited in claim 9, further comprising a tension vacuum port in communication with said vacuum cylinder on a first side of said piston and a compression vacuum port in communication with said vacuum cylinder on a second side of said piston.

11. The diagnostic system as recited in claim 9, further comprising an attachment vacuum port in communication with said suction cup through said hollow shaft.

12. The diagnostic system as recited in claim 8, further comprising a seal assembly vacuum port in communication with a volume between said outer seal and said inner seal.

13. The diagnostic system as recited in claim 8, wherein said vacuum assisted attachment comprises a one square inch suction cup.

14. A method of determining a defect type within a core composite structure comprising the steps of:

- (1) affixing a seal assembly to a skin of a core composite structure;
- (2) affixing an attachment to the skin of the core composite structure;
- (3) displacing the attachment relative to the seal assembly; and
- (4) relating said step (3) to said step (2) to determine a defect type within the core

composite structure.

15. A method as recited in claim 14, wherein said step (3) further comprises applying a vacuum to displace the attachment.

16. A method as recited in claim 14, wherein said step (4) further comprises relating an applied load relative a linear displacement.

17. A method as recited in claim 14, further comprising the steps of:

- (a) identifying a stiffness reduction in a compression direction.

18. A method as recited in claim 17, further comprising the steps of:

- (b) identifying a stiffness reduction in a tension direction; and
- (c) identifying a non-linear stiffness increase in the tension direction.

19. A method as recited in claim 17, further comprising the steps of:

- (b) identifying a stiffness reduction in a tension direction; and
- (c) identifying a linear stiffness increase in the tension direction.

20. A method as recited in claim 14, further comprising the steps of:

comparing a first applied load relative to a first linear displacement at a first location on the core composite structure to a second applied load relative to a second linear displacement at a second location on the core composite structure.

21. A method as recited in claim 14, wherein said step (1) further comprises applying a vacuum within the seal assembly to affix the seal assembly to the skin.

22. A method as recited in claim 14, wherein said step (2) further comprises applying a vacuum within the attachment to affix the attachment to the skin.